REMARKS

Remark 1:

Applicant hereby amends claims 1, 5, 9, 13, 15 and 17 to render the claims more definite. As stated by Applicant previously, Examiner will note that the vertical flow, cryogenic liquid turbine generators and pumps of the present invention having main product-lubricated bearings with associated, specifically-recited structure plus function *operating at temperatures between about 70 K and about 140 K* are not taught in the prior art.

More particularly, Applicant respectfully points out that Examiner may have made an erroneous assumption. It will be noted that typical cryogenic liquid turbine generators and pumps operate at extremely cold temperatures, i.e., well below "freezing" or "zero" degrees Centigrade. Describing temperatures at very low temperatures has often been achieved using the Kelvin scale.

"The kelvin (symbol: K) is a unit increment of temperature and is one of the seven SI base units. The Kelvin scale is a thermodynamic absolute temperature scale where absolute zero, the theoretical absence of all thermal energy, is zero kelvin, i.e., 0 K. The Kelvin scale and the kelvin are named after the British physicist and engineer William Thomson, 1st Baron Kelvin (1824–1907), who wrote of the need for an "absolute thermometric scale". Unlike the degree Fahrenheit and degree Celsius, the kelvin is not referred to as a 'degree', nor is it typeset with a degree symbol; that is, it is written K and not °K." (http://en.wikipedia.org/wiki/Kelvin)

Typical cryogenic liquid turbine generators and pumps operate at very low temperatures, i.e., between about 70 K and 140 K. Examiner's assumption that "for purposes of examination, the ... temperature range of the cryogenic turbine generator is 180 degrees C" is greater than Applicant believes would be the actual "range" of operation of cryogenic liquid handling equipment described and claimed

in the present invention. Applicant submits that 180 degrees Celsius, a temperature more equivalent to boiling oil than cryogenic liquids, is a great deal "hotter" than the range of cryogenic liquid handling operating temperatures proposed by Applicant.

"In physics, cryogenics is the study of the production of very low temperature (below -150 °C, -238 °F or 123 K) and the behavior of materials at those temperatures. ... The workers at the National Institute of Standards and Technology at Boulder, Colorado have chosen to consider the field of cryogenics as that involving temperatures below -180 °C (93.15 K). ... Cryogenic temperatures, usually well below 77 K (-196 °C) are required to operate cryogenic detectors."
(http://en.wikipedia.org/wiki/Cryogenics)

As stated above, Examiner will note that the vertical flow, cryogenic liquid turbine generators and pumps of the present invention operating at temperatures between about 70 K and about 140 K are not taught in the prior art. With all due respect, the prior claims as amended herein describe subject matter that is novel and non-obvious.

Remark 2:

Applicant has also amended claims 1, 5, 9, 13, 15 and 17 to render the claims more definite with regard to linear expansion and contraction of the material used for the spacer. It will be understood that while thermal expansion occurs upon heating a material, "thermal linear contraction" or "thermal negative linear expansion" occurs upon cooling typical materials.

The thermal contraction due to cooling down is also called negative expansion. (See Wikipedia and others). During fabrication of the cryogenic liquid turbine generators and pumps, the spacer is mounted and assembled under room temperature and it then contracts or shrinks in the cold cryogenic

environment. This is completely different from the electric motor cited by the Examiner, where the spacer is also mounted or assembled under room temperature but then expands due to increasing temperature or heat. These are completely different problems. Compared to he effects seen upon other materials, heating a given material is fundamentally different than cooling said material, such as in the case of ice, i.e., if you heat up ice it expands and melts, but if you cool down ice it cracks due to shrinkage.

Remark 3:

Applicant hereby adds new claims 19-24 directed to methods of the present invention. Applicant submits that prior art does not teach methods for producing electrical energy from vertical flow, cryogenic liquid turbine generators operating at temperatures between about 70 K and about 140 K, or between about -203.15 degree Celsius and about -133.15 degree Celsius. Applicant further submits that prior art does not teach methods for transporting cryogenic liquid using vertical flow, cryogenic liquid turbine pumps operating at temperatures between about 70 K and about 140 K. With all due respect, the newly added claims describe subject matter that is novel and non-obvious.

Remark 4:

The pending claims of the present invention fall into 4 categories, i.e., (i) vertical flow, cryogenic liquid turbine generators, (ii) vertical flow, cryogenic liquid pumps, (iii) methods for generating electrical energy using vertical flow, cryogenic liquid turbine generators, and (iv) methods for transporting cryogenic liquids using vertical flow, cryogenic liquid pumps, all operating at temperatures between about 70 K and about 140 K. As pointed out by Dr. Kimmel in his DECLARATION OF HANS E. KIMMEL, PH.D., UNDER 37 CFR 1.132, prior art related to electric motors operating at room-temperature or higher is non-analogous. Applicant respectfully requests Examiner withdraw cited Nakamura and Brown as obviating references under 35 USC 103(a) inasmuch as the cited references are nonanalogous art.

The Examiner's attention is respectfully drawn to the Manual of Patent Examination Practice, and in particular to section 2141.01(a):

> **TO RELY ON A REFERENCE UNDER 35 U.S.C. 103, IT MUST BE ANALOGOUS PRIOR ART**
>
> The examiner must determine what is "analogous prior art" for the purpose of analyzing the obviousness of the subject matter at issue. "Under the correct analysis, any need or problem known in the field of endeavor at the time of the invention and addressed by the patent [or application at issue] can provide a reason for combining the elements in the manner claimed. " KSR International Co. v. Teleflex Inc., 550 U.S. 398, 82 USPQ2d 1385, 1397 (2007). Thus a reference in a field different from that of applicant's endeavor may be reasonably pertinent if it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his or her invention as a whole.

While the Court recently slightly eased up on the requirement for a finding of the traditional "suggestion-teaching-motivation" in obviating prior art, it clearly cannot have intended the Patent Office to completely do away with the well known doctrine that hindsight reconstructions based on the Applicants' own invention are vehemently forbidden. In re Fritch, 23 U.S.P.Q. 2d 1780, 1784 (Fed. Cir. 1992).

In the present case, Examiner has cited 2 prior art references both directed to electric motors and generators operating at temperatures at or above room temperature, not vertical flow, cryogenic liquid turbine generators or pumps operating at temperatures between about 70 K and about 140 K. The cited prior art references are completely unrelated to cryogenic liquid handling equipment. The problems associated with an increased shaft length between stationary bearings on a cryogenic liquid turbine or pump in a system utilizing a thrust equalizing mechanism would not arise with the direct drive electric motor or generator cited by Examiner. It would not be logical to expect the attention of an inventor in a cryogenic liquid, chemical engineering-type position to be drawn to prior art solutions found in the design of electric motors, and more particularly, to the height of a spacer made of a material having

predetermined thermal expansion coefficient between a rotor hub and magnetic surfaces disposed therein.

Moreover, the teachings cited by Examiner teach away from the present invention. The sleeve **14** described in Brown maintains components in tension, as compared to the use of stainless steel which is described as having "about the same thermal expansion as the rotor hub and will move away from the magnet surface when rotating." However, the present invention is directed to a "spacer", i.e., a component which serves to increase the distance between component parts. This is the opposite of trying to maintain "tension" between component parts. In the present invention, it is this increase in distance due to the spacer itself which must be compensated for. The teaching of Brown, i.e., the use of a fiberglass sleeve material to maintain rotor and magnets closely coupled together, would teach away from the solution to use a fiberglass spacer to reduce the span between main bearings in a cryogenic liquid turbine or pump.

Remark 5: (NO NEW MATTER)

Applicant submits that the corrections presented herein present no new matter. All of the devices, systems, methods and/or compositions claimed herein are taught in the Drawings, Specification, Claims and Abstract and other portions of the Application as originally filed.

Remark 6: (REQUEST FOR TELEPHONIC OR IN-PERSON EXAMINER'S INTERVIEW)

Applicant hereby invites and requests the Examiner to attempt to resolve any further defects, deficiencies, errors or other grounds of rejection or objection to the present application, either on a formal or informal basis, by Telephonic or In-Person Examiner's Interview under 37 CFR 1.133 (see also MPEP 713.01 et seq.). Attorney for Applicant(s) can be reached from 9:00 AM-5:00 PM Monday-Friday at telephone number 650-348-1444 or by fax to (650) 348-8655 or by e-mail at RKS@ATTYCUBED.COM.

///

CONCLUSION

Applicant respectfully submits that for all the foregoing reasons, the claimed subject matter describes patentable invention. Furthermore, Applicant submits that the specification is adequate and that the claims are now in a condition for allowance. No new matter has been entered.

Applicant hereby respectfully requests Examiner to withdraw the cited references as anticipating or obviating prior art, enter these amendments, find them descriptive of useful, novel and non-obvious subject matter, and authorize the issuance of a utility patent for the truly meritorious, deserving invention disclosed and claimed herein.

Without further, Applicant does not intend to waive any claims, arguments or defenses that they may have in response to any official or informal communication, paper, office action, or otherwise, and they expressly reserve the right to assert any traverse, additional grounds establishing specificity and clarity, enablement, novelty, uniqueness, non-obviousness, or other patentability, etc.

Further, nothing herein shall be construed as establishing the basis for any prosecution history or file wrapper estoppel, or similar in order to limit or bar any claim of infringement of the invention, either directly or under the Doctrine of Equivalents.

///

Respectfully submitted,

RAY K. SHAHANI
ATTORNEY AT LAW

Dated: September 29, 2009

By: /Ray K. Shahani/
Ray K. Shahani, Esq.
Attorney for Applicant(s)

Ray K. Shahani, Esq. Registration No.: 37,554
Attorney at Law
Twin Oaks Office Plaza
477 Ninth Avenue, Suite 112
San Mateo, California 94402-1854
Telephone: (650) 348-1444 Facsimile: (650) 348-8655
E-mail: rks@attycubed.com

CERTIFICATE OF TRANSMISSION:
I hereby certify that this paper and the documents referred to as attached therein are being filed using USPTO EFS-Wed service under 37 CFR 1.10 on the date indicated and is addressed to "Commissioner for Patents.
Signed: /Leo K. Lai/ . Date Transmitted: September 29, 2009